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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/752,929	01/07/2004	Andrew Marshall	TI-20142.2	5790
23494	7590	06/22/2006	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			LE, THAO X	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 06/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/752,929

Applicant(s)

MARSHALL ET AL.

Examiner

Thao X. Le

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5596524 to Lin et al. in view of US 5369295 to Vinal and US 5393684 to Ghezzi et al.

Regarding claim 25, Lin discloses a method for forming EEPROM cell in fig. 4B on a substrate, column 4 line 45, having an outer surface, the method comprising the steps of: forming a deep conductive region 408 of a first conductivity type (N-type), column 4 line 56, in the substrate below the substrate's outer surface; forming first and

second conductive regions 402/403 of a first conductivity type (N), fig. 4B, in the substrate below the substrate's outer surface, the first and second conductive regions 402/403 are laterally displaced from one another by a predetermined distance, forming an insulating layer 404, column 4 line 51, outwardly from the outer surface of the substrate, fig. 4B, the insulating layer 404 positioned so that its edges are substantially in alignment between the first and second conductive regions 402/403, fig. 4B, forming a floating gate layer 406, column 4 line 50, outwardly from the insulating layer 404 and in substantially the same shape as the insulating layer 404, fig. 4B; and wherein the deep conductive region 220 is operable to provide a source of charge for placement on the floating gate layer 406 when programming the EEPROM cell, column 4 lines 57.

But, Lin does not disclose the deep conductive region is formed to a depth substantially below only portion of the first and second conductive regions.

However, Lin discloses the deep conductive region 408 is substantially coplanar with the first and second conductive regions 402/403. And Vinal discloses a N-channel transistor in fig. 6 comprising a deep conductive region (N depleted region) is formed to a depth completely below the first and second conductive regions N+. In addition, Ghezzi discloses a EEPROM cell in fig. 21 comprises a floating gate 7, a first and second conductive region n+ in the substrate S, and a deep conductive region n- is formed to a depth substantially below only portion of the first and second conductive regions n+. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the deep conductive region teaching of Vinal with Lin's method, because it

would have created a device with low gate and diffusion capacity allows conduction carriers to flow within the channel at a predetermined depth in the substrate below the gate, without requiring an inversion layer as taught by Vinal, see abstract. Or at the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the deep conductive region teaching of Ghezzi with Lin's method, because it would have improved the electrical operating characteristics of the cell and a benefit in the capacitive couplings of the cell, allowing a reduction in the overall dimensions as taught by Ghezzi in col. 4 lines 15-25. Or at the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the deep conductive region teaching of Vinal and/or Ghezzi with Lin's method, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

Regarding claims 26-27, Lin discloses the method wherein the insulating layer 404 is formed from oxide, column 4 line 47, wherein the floating gate layer 406 is formed from polysilicon, fig. 4A.

Regarding claim 28, Lin does not disclose the method wherein the deep conductive region 408 is doped on the order of $1 \times 10^{16} \text{ cm}^{-3}$.

However, Lin discloses the method wherein the deep conductive region 408 is N⁺ doped, fig. 4B. Accordingly, it would have been obvious to one of ordinary skill in art to use the general concentration deep doping region 408

teaching of Lin in the range as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

Response to Arguments

4. Applicant's arguments with respect to claims 25-28 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to be 'Thao X. Le', with a long horizontal line extending to the right.

Thao X. Le
16 June 2006